

# Radiation protection aspects of work activities with materials with enhanced content of naturally occurring radionuclides (NORM & TENORM)

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## Background

Processing of raw materials may lead to the enrichment of naturally occurring radionuclides in end- or by-products and residues. The term (TE)NORM had been established in the past to summarise the phenomenon (Technologically Enhanced) Naturally Occurring Radioactive Material. The accumulation leads to residues with activity concentrations that can no longer be disregarded from the radiation protection point of view. Another prominent challenge arise form increased levels of Radon in the ambient air at workplaces.

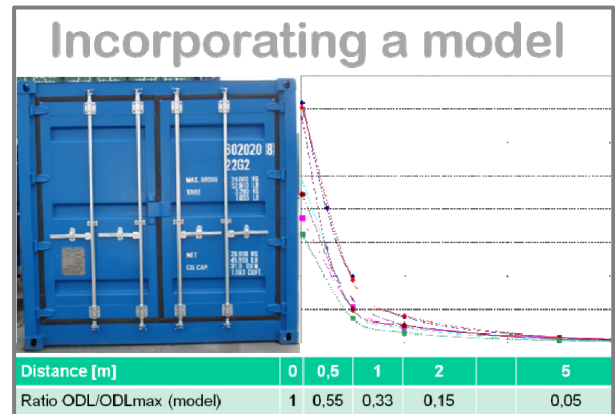


## Radiation protection

Radiation protection regarding the handling of NORM or TENORM contaminated equipment or residues is difficult to implement. Dose rates on the outer surface of contaminated equipment will come up to some hundred  $\mu\text{Sv/h}$ . Activity concentrations of radionuclides in residues may come up to 15.000 Bq/g. Inhalation of Radon progeny may under unfavourable conditions result in annual doses of more than 100 mSv. Aforementioned data demands for effective measures of exposure reduction.

## Taking the European Inventory of (TE)NORM

Many efforts had been paid in the past to get a better insight into the NORM problem but still the specific information on levels of natural radioactivity in waste materials and by-products are scarce. Against the background of increasing transboundary movements of wastes and their disposal or recovery, a harmonized level of supervision of such shipments is necessary to ensure the safe and environmentally sound management of such wastes but a proper functioning of the internal market in the European Union as well. GRS operates a NORM data base and collects information about (TE)NORM residues.



## Regulatory support

Release from supervision is possible supposed that the resulting dose for members of the public does not exceed 1 mSv/a. GRS developed a specific model for calculating the dose in case of disposal or reuse of NORM and TENORM.

Surveillance requires a clear insight to legal and technical requirements of waste disposal sites. GRS developed and evaluated different disposal options for NORM and TENORM.

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